REMARKS

Objections

Specification

Amendments to the specification have been presented in response to the Examiner's objections regarding various drafting informalities. No new matter has been added, and support for the changes is found throughout the original specification.

The Applicant respectfully requests that the Examiner withdraw his objections to the specification.

Drawings

Amendments to the specification and drawings have been presented in response to the Examiner's objections to the drawings on record. No new matter has been added and support for the changes is found throughout the original specification.

The Applicant respectfully requests that the Examiner withdraw his objections to the drawings.

Claims

Examiner has objected to the following use of "the" in claim 20 as being difficult to understand. For reference, claim 20 reads as follows:

> 20. An apparatus comprising:
> a plurality of processing units to correspondingly process a plurality of network traffic flows; and
> a shared CRC generation block coupled to the processing units to alternately generate a CRC value for a data block of a selected one of the network traffic flows, the shared CRC generation block including ***at least one CRC generation unit*** to iteratively generate a first CRC value for the data block of the selected one of the network traffic flows, ***the at least one CRC generation unit*** including a plurality of CRC calculation assemblies to be selectively employed to incrementally calculate a CRC value for a first plurality of data word groups, the calculation being iteratively performed, one iteration at a

time, and the selection of the CRC calculation assemblies for the various iterations being made in accordance with group sizes of extracted data word groups of the first plurality data words for the various iterations.

As the added emphasis clarifies, the Applicant is using "the" to refer to a previously defined element. The Applicant asserts that such a usage is an acceptable referencing technique. Therefore the Applicant respectfully requests that the Examiner withdraw this objection to this claim.

Claim Rejections

35 USC 112 Rejections

The Examiner has rejected claim 5 under 35 USC 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements. Specifically, the Examiner states that claim 2, for example, is specified to operate only on groups of words less than or equal to n/2. However, the Examiner goes on to state, claim 5, which is dependent on claim 2, is specified to operate only on groups of words greater than n/2. Applicant respectfully traverses this rejection of these claims.

Claims 2 and 5 read as follows:

2. The apparatus of claim 1, wherein the plurality of CRC calculation assemblies comprise a ***first*** CRC calculation assembly coupled to the data word extractor to incrementally calculate the CRC value for said plurality of data word groups for an iteration, whenever the data word extractor extracts a data word group of n/2 or less bytes for the iteration , where n is an even integer.

5. The apparatus of claim 2, wherein the plurality of CRC assemblies further comprise a ***second*** CRC calculation assembly coupled to the data word extractor to incrementally calculate the CRC value for said first plurality of data word groups for an iteration, whenever the data word extractor extracts a data word group of more than n/2 bytes for an iteration.

As made clear by the added emphasis, while the first CRC calculation assembly may be used for a data word group of n/2 or less bytes the second CRC calculation assembly is used for a data word group of more than n/2 bytes. Applicant believes that the Examiner has the mistaken assumption that the first and second CRC calculation assemblies have to be in series with one another. This is due to the Examiner's later comments regarding "cascading CRC assemblies". However, referring to Fig. 3 along with the quoted claim language, it becomes evident that the two assemblies are connected in a parallel relationship with the data word extractor. Applicant asserts that this is a permissible cooperative relationship between the two elements of the two claims. Therefore it is respectfully requested that this rejection of these claims be withdrawn.

Claims 6, 7, 16, 17, 18, 24, 25, and 26 have similar language and therefore present similar cooperative relationships between the two elements. The Applicant respectfully requests that these rejections also be withdrawn.

In the Office Action, claim 9 is rejected under 35 USC 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Specifically the Examiner states that claim 9 does not further define or alter the contents of claim 1, and that both claims provide the same function. Claim 9 reads as follows:

> 9. The apparatus of claim 1, wherein the plurality of selectors comprise a first selector coupled to the storage elements and the plurality of CRC calculation assemblies to selectively re-circulate one of the stored results back to the selected one of the CRC calculation assemblies for the next iteration of the calculation, and

a second selector coupled to the first selector to cooperate with the first selector to selectively output one of the stored results as the calculated CRC value at the end of the iterative calculation.

Claim 9 provides more detailed structure to claim 1 by establishing first and second selectors. The first selector selectively re-circulates one of the stored results back to the selected one of the CRC calculation assemblies, while the second selector facilitates the selective output of the stored results as the calculated CRC value. Applicant asserts that claim 9 is presented in proper dependent form, further defining the independent claim 1. Applicant respectfully requests that the Examiner withdraw this rejection of this claim.

35 USC 102 Rejections

35 USC 102(b) Rejection based on Shih

In the Office Action, claim 1 is rejected under 35 USC 102(b) as being fully anticipated by Shih. The Applicant respectfully traverses this rejection of this claim.

Claim 1, for example, recites:

1. An apparatus comprising:
a data word extractor to successively extract a first plurality of data word groups from a stream of input data, one data word group at a time, with each extracted data word group having a group size of at most n bytes, where n is an integer;
a plurality of CRC calculation assemblies coupled to the data word extractor to be selectively employed to incrementally calculate a CRC value for the first plurality of data word groups, the calculation being iteratively performed, one iteration at a time, and for each iteration, the selection of the CRC calculation assemblies being made in accordance with the group size of the data word group extracted for the iteration;

a plurality of storage elements correspondingly coupled to the plurality of CRC calculation assemblies to correspondingly store the results generated by the corresponding ones of the CRC calculation assemblies for one iteration of the iterative calculation; and

a plurality of selectors coupled to storage elements and the plurality of CRC calculation assemblies to selectively re-circulate one of the stored results back to the selected one of the CRC calculation assemblies for the next iteration of calculation, and to selectively output one of the stored results as the calculated CRC value at the end of the iterative calculation.

As is well established, to make a *prima facie* anticipation rejection the Examiner must provide a single prior art document that describes, either expressly or inherently, each and every element of the rejected claim. Therefore the absence of even a single limitation in the cited document constitutes an improper anticipation rejection.

Shih does not suggest, teach or discuss "***a plurality of CRC calculation assemblies***...selectively employed to incrementally calculate a CRC value for the first plurality of data word groups" as required by claim 1, for example. In Shih, there is one logic circuit that is used to generate CRC values. This logic circuit is sequentially fed data from the registers; "each of the data registers 36-39 stores a four-bit nibble for processing by the four-bit look-ahead logic **18**." Shih column 4, line 1. There is insufficient detail in Shih to even suggest that the calculation taking place in the look-ahead logic is done by a plurality of calculation assemblies. And because "the identical invention must be shown in as complete detail as is contained in the ... claim," it would be improper to speculate that the logic included a plurality of calculation assemblies. Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236 (Fed. Cir. 1989). Furthermore, even assuming *arguendo* that the logic did contain a plurality of calculation assemblies, they would not be correspondingly coupled to a plurality of storage elements as required

by claim 1, for example. As stated earlier, in Shih the registers are connected in series with one another to sequentially feed the logic. Therefore, because these elements are not found in the cited document, a 35 USC 102 rejection is improper. Of course, there are other bases on which claim 1 may be distinguished from the cited article and Applicant does not rely solely on the distinction above; however, this is believed to be more than sufficient to overcome this rejection. Therefore, it is respectfully requested that the Examiner's rejection of claim 1 be withdrawn.

35 USC 102(b) Rejection of Claims 12-15 based on NN901051

In the Office Action claims 12-15 are rejected under 35 USC 102(b) as being fully anticipated by NN901051. The Applicant respectfully traverses this rejection of these claims.

Claim 12, for example, recites:

> 12. A method comprising:
> successively extracting a first plurality of data word groups from a stream of input data, one data word group at a time, with each extracted data word group having a group size of at most n bytes, where n is an integer;
> selectively employing a plurality of CRC calculation assemblies coupled to the data word extractor to incrementally calculate a CRC value for the first plurality of data word groups, with the calculation being iteratively performed, one iteration at a time, and for each iteration, selecting the CRC calculation assemblies in accordance with the group size of the data word group extracted for the iteration;
> correspondingly storing the results generated by the plurality of CRC calculation assemblies for one iteration of the iterative calculation into a plurality of storage elements; and
> selectively re-circulating one of the stored results back to the selected one of the CRC calculation assemblies for the next iteration of calculation, and selectively outputting one of the stored results as the calculated CRC value at the end of the iterative calculation.

NN901051 does not suggest, teach or discuss "***correspondingly storing the results*** generated by a plurality of CRC calculation assemblies for one iteration of the iterative calculation ***into a plurality of storage elements***" as required by claim 12, for example. The CRC values generated in the cited document are stored in a ***single*** CRC register. See Fig. 1 of cited document. There is nothing to suggest, and likewise it would be improper to speculate, that the single CRC register depicted in Fig. 1, was really a group of a plurality of storage elements, as required by claim 12, for example. Therefore, because NN901051 does not contain a plurality of storage elements that correspond with a plurality of calculation assemblies the anticipation rejection is improper. Of course, there are other bases on which claim 12 may be distinguished from the cited article and Applicant does not rely solely on the distinction above; however, this is believed to be more than sufficient to overcome this rejection. It is respectfully requested that the Examiner's rejection of claim 12 be withdrawn.

Claims 13-15 are dependent upon, and incorporate the same limitations from, claim 12. Thus, for at least the same reasons, claims 13-15 are patentable over NN901051. The Applicant respectfully requests that the Examiner withdraw his rejection of claims 13-15.

35 USC 103 Rejections

35 USC 103 Rejection of Claim 20 based on Albertango

In the Office Action claim 20 is rejected under 35 USC 103(a) as being unpatentable over Albertango. Applicant respectfully traverses this rejection of this claim.

Claim 20 recites:

> 20. An apparatus comprising:
> a plurality of processing units to correspondingly process a plurality of network traffic flows; and
> a shared CRC generation block coupled to the processing units to alternately generate a CRC value for a data block of a selected one of the network traffic flows, the shared CRC generation block including at least one CRC generation unit to iteratively generate a first CRC value for the data block of the selected one of the network traffic flows, the at least one CRC generation unit including a plurality of CRC calculation assemblies to be selectively employed to incrementally calculate a CRC value for a first plurality of data word groups, the calculation being iteratively performed, one iteration at a time, and the selection of the CRC calculation assemblies for the various iterations being made in accordance with group sizes of extracted data word groups of the first plurality data words for the various iterations.

Albertango does not suggest, teach or discuss "a plurality of CRC calculation assemblies to be selectively employed to incrementally calculate a CRC value for a first plurality of word groups" as required by claim 20, for example. In the Office Action the Examiner summarily states that "Albertango describes a CRC generator consisting of the combination of CRC generator chips, staged and gated according to word size, to operate in a parallel word-wise manner...for the purpose of generating CRC words on data flowing through a network." The Applicant is unsure of what elements of the cited document the Examiner believes corresponds to the claim elements, however, it is clear that the above quoted element is not found anywhere in the cited document. For example, if the examiner is referring to the "four discrete chips of the first EXOR array," *Albertango* page 67, as corresponding to this element, it is clear that these do not calculate a CRC value as required by claim 20. These chips are used to generate an intermediate value w(n) which is then input into the second EXOR array to generate the f(n), or future CRC value.

Alternatively, if the Examiner considers the first and second EXOR arrays to correspond to the "plurality of CRC calculation assemblies," the first full paragraph on page 67 makes it clear that these are used in combination to develop a CRC value. "The first EXOR array generates the terms $w(n)$...according to Equation 4. ...This second array must implement Equation 5" to produce $y_i(N)$ (the CRC value). This arrangement is further described in the next paragraph as the "two combinational stages." This combination arrangement negates the ***selective employment*** of a ***plurality of CRC calculation assemblies***, as required by claim 20, for example.

It is also unclear, what, from the cited document, the Examiner believes to correspond to other elements of claim 20, e.g., the CRC generation unit, the shared generation block, and the processing units. Therefore the examiner has not made a *prima facie* case that in view of the cited document, the claimed invention "as a whole" would have been obvious at a time before the invention was made to a person skilled in the art, as required for an obviousness rejection. The Applicant respectfully requests that the Examiner withdraw this rejection of this claim.

The Applicant also traverses the Examiner's statement that an error control system implemented with a multichannel LAN interface, makes the "plurality of processing units to correspondingly process a plurality of network traffic flows" element of claim 20, for example, obvious. There is nothing in the cited document to suggest that the former implementation was done in accordance with the quoted claim language.

Of course, there are other bases on which claim 20 may be distinguished from the cited article and Applicant does not rely solely on the distinction above; however, the above distinctions are believed to be more than sufficient to overcome this rejection.

Therefore it is respectfully requested that the Examiner's rejection of claim 20 be withdrawn.

35 USC 103 Rejection of Claims 2-6 and 8 based on Shih in view of NN901051

The Examiner has also rejected claims 2-6 and 8 under 35 USC 103 as being unpatentable over Shih in view of NN901051. This rejection by the Examiner of these claims is respectfully traversed.

The Examiner's misinterpretation that the Applicant's claims 2-6 and 8 must use multiple CRC calculators in cascade may obfuscate the basis of this rejection. However, it is clear that neither Shih nor NN901051, alone or in combination, provides the subject matter of the rejected claims. For example, as indicated above, Shih does not suggest, teach or discuss selectively employing one of "a plurality of CRC calculation assemblies...to incrementally calculate a CRC value for the first plurality of data word groups," as required by claim 2, for example. Furthermore, NN901051 does not correct this deficiency. The structure described in NN901051 provides a "bit serial function to be converted into one with a parallel implementation" *NN901051*, page 3. So while some of the data may be processed in a parallel fashion, i.e. "a parallel implementation of f bits", there is no ***plurality*** of calculation assemblies. And, even assuming *arguendo*, that there was a plurality of calculation assemblies, the cited document does not base the selection of the calculation assembly on the "group size of the data word group extracted for the iteration." NN901051 simply arranges the data so that the smaller size logic fills first. "The data bus enable signals gate the data bus so that if only half the data bus (8 bits) is valid, the correct half of the bus is presented to

the 8-bit CRC logic." *NN901051*, page 2. It does not base the assignation on ***the group size of the data word group for each iteration***.

Furthermore, neither NN901051 nor Shih, alone or in combination, present a plurality of storage elements correspondingly coupled to the plurality of CRC calculation assemblies, as required by claim 2, for example. Of course, there are other bases on which claim 2 may be distinguished from the cited article and Applicant does not rely solely on the distinctions above; however, these are believed to be more than sufficient to overcome this rejection. It is therefore respectfully requested that the Examiner withdraw his rejection of claim 2.

Claims 3-6 and 8 either depend from, or include similar limitations as claim 2, and therefore, for at least the reasons stated above, present patentable subject matter. The Applicant respectfully requests that the Examiner withdraw his rejection of claims 3-6 and 8.

35 USC 103(a) Rejection of Claims 10-11 based on Shih

The Examiner has also rejected claims 10 under 35 USC 103 as being unpatentable over Shih. This rejection by the Examiner of these claims is respectfully traversed.

As discussed above, Shih does not suggest, teach or discuss "***a plurality of CRC calculation assemblies***...selectively employed to incrementally calculate a CRC value for the first plurality of data word groups" as required by claim 1, for example. Claims 10-11 depend upon, and include the same limitations as, claim 1. Therefore, because the Examiner presents nothing to correct for this deficiency, claims 10-11 are patentable

for at least the above reasons. The Applicant respectfully requests that the Examiner withdraw this rejection of these claims.

35 USC 103(a) Rejection of Claims 21-23 based on Albertango in view of Shih and further in view of NN901051

The Examiner has also rejected claims 21-23 under 35 USC 103 as being unpatentable over Albertango, in view of Shih and further in view of NN901051. This rejection by the Examiner of these claims is respectfully traversed.

As discussed above, Albertango does not suggest, teach or discuss "a plurality of CRC calculation assemblies to be selectively employed to incrementally calculate a CRC value" as required by claim 20, for example. Claims 21-23 depend upon and include the same limitations as claim 20. And because neither, Shih nor NN901051, either alone or in combination, corrects for these deficiencies, claims 21-23 are patentable for at least the same reasons. Therefore, the Applicant respectfully requests the Examiner to withdraw his rejection of these claims.

35 USC 103(a) Rejection of Claim 19 based on NN901051

The Examiner has also rejected claim 19 under 35 USC 103 as being unpatentable over NN901051. This rejection by the Examiner of this claim is respectfully traversed.

As discussed above, NN901051 does not suggest, teach or discuss "***correspondingly storing the results*** generated by a plurality of CRC calculation assemblies for one iteration of the iterative calculation ***into a plurality of storage***

elements" as required by claim 12, for example. Claim 19 includes the same limitations as claim 12. And because the Examiner presents nothing to correct for these deficiencies, claim 19 is patentable for at least the same reasons. Therefore, the Applicant respectfully requests the Examiner to withdraw his rejection of this claim.

35 USC 103(a) Rejection of Claim 27 based on Albertango in view of NN901051

The Examiner has also rejected claim 27 under 35 USC 103 as being unpatentable over Albertango, in view of NN901051. This rejection by the Examiner of these claims is respectfully traversed.

As discussed above, Albertango does not suggest, teach or discuss "a plurality of CRC calculation assemblies to be selectively employed to incrementally calculate a CRC value" as required by claim 20, for example. Because NN901051does not correct these deficiencies, claim 27, which includes a similar limitation, is patentable for at least the same reasons. Therefore, the Applicant respectfully requests the Examiner to withdraw his rejection of this claim.

Conclusion and Epilogue

In view of the foregoing, Applicants respectfully submit that claims 1-27 as presented are in condition for allowance. Thus, early issuance of Notice of Allowance is respectfully requested.

If the Examiner has any questions, he is invited to contact the undersigned at (503) 796-2972.

The Commissioner is hereby authorized to charge shortages or credit overpayments to Deposit Account No. 500393. A Fee Transmittal is enclosed in duplicate for fee processing purposes.

Respectfully submitted,
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